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(54) Title: BUTTERLIKE COMPOSITIONS AND METHODS OF MANUFACTURING SAME		
(57) Abstract A butterlike composition which comprises a solidified emulsion of at least one vegetable oil water and at least one hydrocolloid fiber, the composition having butterlike properties, said fiber preferably being at least about 18 weight percent of said composition, as well as methods for making the same are disclosed.		

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BUTTERLIKE COMPOSITIONS AND METHODS OF MANUFACTURING SAME

This application is a continuation-in-part of U.S. Application No. 09/096,475 filed
5 June 12, 1998, the entire disclosure of which is incorporated herein by reference.

1. FIELD OF THE INVENTION

The present invention relates to a butterlike composition and method of
manufacturing same, and more particularly, to a butterlike composition of natural,
10 unmodified vegetable oils and a nutritional fiber. Specifically, the present invention
concerns a novel technology for vegetable oil solidification, which preserves the oil's
quality, its original molecular structure and composition, its biological characteristics and its
nutritional value, by solidifying the oil with a nutritional fiber.

15 2. BACKGROUND OF THE INVENTION

Butterlike substances are soft whitish or yellowish fatty solids processed for
cooking, frying and for table use as spreads. Examples include butter which is a soft
whitish or yellowish fatty solid that separates from milk or cream when it is churned, and
margarine which is made of refined vegetable oils which undergo chemical solidification
20 (i.e., hydrogenation, saturation) and/or blended sometimes with animal fats and emulsified
usually with water or milk.

The solid characteristic of many of the prior art butterlike substances results from the
high percentage of saturated fatty acids contained therein. According to the prior art,
solidification is achieved either by purification, as is the case for butter, or by hydrogenation
25 or mixing with saturated fatty acids, as is the case for types of margarine. In both cases,
however, the make-up of the oils employed, i.e., the chemical structure and/or composition
are modified.

A large body of information indicates that daily consumption of saturated fatty acids
has a bad influence of human health, especially due to the rise in blood cholesterol levels
30 inflicted thereby and the possible development of cardiovascular diseases, arteriosclerosis
and gallstones. In addition, butter itself includes high percentage of cholesterol which by
itself increases the chances of developing such diseases.

Margarine, on the other hand, which also includes relatively high levels of saturated
fat, is in most cases the product of catalyzed hydrogenation, which introduces trans fatty
35 acids therein, which were shown to cause membrane alterations which may lead to

development of cancer. Furthermore, during hydrogenation the chemical make-up of the vegetable oil employed for the production of margarine changes, and as a result, beneficiary influences of such make-up on human health is lost.

Vegetable oils, especially olive oil, are low in saturated fatty acids. Indeed, many studies have shown that olive oil consumption as a major source of fatty acids reduces blood cholesterol levels in patients suffering from high blood cholesterol (e.g., cholestolemia). It was further shown that olive oil consumption lowers the light density lipoprotein/high density lipoprotein (LDL/HDL) ratio in the blood, i.e., it decreases the blood level of "bad" cholesterol and thereby lowers the risk of developing cardiovascular diseases. It is therefore not surprising that some physicians refer to olive oil as a medicament. Other vegetable oils are also known to have beneficiary effects on human health.

Consumption of nutritional fibers is known to reduce blood cholesterol, to assist in digestion and to lower the chances of developing intestine and colon cancers.

There is thus a widely recognized need for, and it would be highly advantageous to have, a butterlike composition devoid of the bad influences associated with butter and/or margarine consumption and which enjoys the benefits of consuming unmodified vegetable oil and a nutritional fiber. In addition, it would be advantageous to have a butterlike composition that further contains a dietary supplement and enjoys the benefit of promoting healthy cholesterol.

3. SUMMARY OF THE INVENTION

According to the present invention there is provided butterlike composition comprising a solidified emulsion of at least one vegetable oil, water and at least one hydrocolloid which is a fiber, the composition having butterlike properties. In one aspect, the fiber serves as a solidifying, gelating or thickening agent. According to a preferred embodiment, the butterlike composition comprises at least about 18% weight percent fiber. According to certain embodiments, the butterlike composition comprises about 18-60 weight percent fiber, preferably about 20-40 weight percent fiber, more preferably about 20-30 weight percent fiber. According to yet another preferred embodiment, the butterlike composition comprises about 36 weight percent fiber. According to still further features, in a preferred embodiment, the fiber is a nutritional fiber.

According to further features in preferred embodiments of the invention described below, the vegetable oil maintains its chemical make-up while in the composition.

According to still further features in the described preferred embodiments at least one vegetable oil maintains its chemical make-up while in the composition.

According to still further features in the described preferred embodiments the butterlike composition further comprises at least one substance selected from the group consisting of emulsifier, stabilizer, flavor, preservative, colorant, acid and salt.

According to still further features in the described preferred embodiments the
5 butterlike composition further comprises at least one dietary supplement. In a highly preferred embodiment, the dietary supplement is red yeast.

According to still further features in the described preferred embodiments the vegetable oil is selected from the group consisting of olive oil, cocoa oil, sunflower seed oil, soybean oil, corn oil, sesame oil, peanut oil, coconut oil and palm oil.

10 According to still further features in the described preferred embodiments at least one vegetable oil is a liquid oil at ambient temperature.

As indicated above, in one aspect, the fiber serves as a hydrocolloid in the composition and method of the invention. Hydrocolloids are gelating agents which when present in low amounts act as emulsifiers or stabilizers and when present in high amounts
15 act as thickeners or solidifying agents. The threshold amount for each mode of action depends on the particular hydrocolloid and the particular chemical environment in which it is present. Thus, many emulsifiers, stabilizers and thickeners are hydrocolloids. However, as will be understood by those skilled in the art, there are certain emulsifiers, stabilizers and thickeners that do not function as gelating agents, and therefore are not hydrocolloids. One
20 such example is the emulsifier lecithin.

According to still further features in the described preferred embodiments the hydrocolloid and stabilizer are each independently selected from the group consisting of natural seaweed extracts, natural seed gums, natural plant exudates, natural fruit extracts, animal skin and bone extracts, bio-synthetic gums, starches and fibers. According to the
25 present invention, a fiber is most optimal for use as a thickening or solidifying agent, whereas the other classes of hydrocolloids are better suited for use as emulsifiers and/or stabilizing agents.

According to still further features in the described preferred embodiments (a) the natural seaweed extract is independently selected from the group consisting of carrageenan,
30 alginates, agar, agarose, fucellan and xanthan gum; (b) the natural seed gum is independently selected from the group consisting of guar gum, locust bean gum, tara gum, tamarind gum and psillium gum; (c) the natural plant exudate is independently selected from the group consisting of gum arabic, tragacanth, karaya and ghatti; (d) the natural fruit extract is independently selected from the group consisting of low and high methoxyl
35 pectins; (e) the animal skin and bone extract is independently selected from the group

consisting of gelatin A and B and hydrolyzed gelatin; (f) the bio-synthetic gum is independently selected from the group consisting of xanthan, gellan, curdian and pullulan; (g) the starch is independently selected from the group consisting of natural starch and chemically, physically and enzymatically modified starch; whereas (h) the fiber is
5 independently selected from the group consisting of alpha cellulose, CMC, HPC, HPMG, MC, microcrystalline cellulose and inulin.

According to still further features in the described preferred embodiments the fiber is a nutritional fiber.

According to still further features in the described preferred embodiments the
10 nutritional fiber is inulin.

According to still further features in the described preferred embodiments the inulin is selected from the group consisting of instant gelating inulin and long chain inulin.

According to still further features in the described preferred embodiments the flavor is independently selected from the group consisting of butter flavor, butter vanilla flavor,
15 olive flavor, cocoa or chocolate flavor, roasted mushroom flavor, broccoli flavor, celery flavor, grilled eggplant flavor, asparagus flavor, green bell pepper flavor, raw carrot flavor, fried onion flavor, roasted garlic flavor or artichoke flavor, the preservative is independently selected from the group consisting of potassium sorbate, sodium benzoate, lactic acid and citric acid, the colorant is independently selected from the group consisting of carotenoids,
20 riboflavin, curcumin, beet powder, red color MN and spinach oleoresin, the acid is independently selected from the group consisting of citric acid, glucono delta lactone, whereas the salt is independently selected from the group consisting of sodium chloride and potassium chloride.

According to still further features in the described preferred embodiments the
25 emulsifier is selected from the group consisting of lecithin and sucrose stearate.

According to still further features in the described preferred embodiments the butterlike composition comprises about 5-30 weight percent fat, less than 5 weight percent saturated fat and ingredients providing 50-250 Calories per 100 grams.

According to still further features in the described preferred embodiments the
30 butterlike composition comprises about 15-25 weight percent oil and 20-40 weight percent fiber, more preferably about 20-30 weight percent fiber.

Further according to the present invention there is provided a method of preparing a butterlike composition as described above, the method comprising the steps of (a) mixing at least one vegetable oil with at least one emulsifier for obtaining an oil-emulsifier mixture;
35 (b) while mixing the oil-emulsifier mixture, adding water to the oil-emulsifier mixture at a

rate permitting formation of emulsion; (c) while mixing the emulsion, adding an emulsion stabilizer to the emulsion for obtaining a stabilized emulsion; (d) while mixing the stabilized emulsion, adding to the stabilized emulsion a fiber for obtaining a fiber containing emulsion; and (e) pouring the fiber containing emulsion into molds and allowing
5 the fiber containing emulsion to solidify, thereby obtaining the butterlike composition.

According to still further features in the described preferred embodiments steps (a) through (e) are executed at ambient temperature.

According to still further features in the described preferred embodiments the vegetable oil maintains its chemical make-up throughout steps (a) to (e).

10 Further according to the present invention there is provided an alternative method of preparing a butterlike composition as described above, the method comprising the steps of (a) mixing at least one fiber with water; (b) while mixing, slowly raising the temperature until the fiber is dissolved or dispersed; (c) while mixing, slowly adding at least one vegetable oil together with at least one emulsifier to obtain a stabilized emulsion; (d)
15 allowing the stabilized emulsion to cool while mixing to obtain a cooled emulsion; and (e) pouring the cooled emulsion of step (d) into molds and allowing the emulsion of step to solidify, thereby obtaining the butterlike composition. In a preferred embodiment, step (a) is executed at ambient temperature, i.e. at about 25°C. In another preferred embodiment, the temperature in step (b) is raised to 90-100°C. In yet another preferred embodiment, the
20 emulsion of step (d) is cooled to 60-70°C. Optionally, at least one substance selected from the group consisting of flavor, preservative, colorant, acid and salt is added. Preferably, at least one vegetable oil maintains its chemical make-up throughout steps (c) to (e).

It is an object of the present invention to provide a butterlike composition which is advantageous for human consumption when compared with prior art butterlike products,
25 such as butter and margarine.

It is another object of the present invention to use unmodified olive oil in a butterlike composition because olive oil consumption has many advantages over the consumption of other oils or fats, including in decreasing blood cholesterol levels, reducing the LDL/HDL ratio and thereby reducing the likelihood of developing cardiovascular diseases associated
30 with high blood cholesterol levels and LDL/HDL ratios.

It is yet another object of the present invention to provide a butterlike composition which is very low in fat and in Calorie content as compared with conventional butterlike products.

It is still another object of the present invention to provide a butterlike composition which is, as compared with known solid fat based foods, exceptionally low in saturated fat, yet it still maintains its butterlike properties.

It is however another object of the present invention to provides a butterlike
5 composition with very high content of nutritional fibers, which are known to have beneficiary effects on human health, including in reducing blood cholesterol levels, assisting in digestive processes, and reducing the chances of developing intestine and colon cancers.

It is yet another object of the present invention to provide an animal fat free butterlike composition devoid of harmful trans fatty acids, which are present in
10 hydrogenated butterlike compositions such as margarine.

The present invention successfully addresses the shortcomings of the presently known configurations by providing a butterlike composition which is low in fat, calories and saturated fat, as compared with prior art products, and which includes unmodified fat derived from vegetable oils and a fiber, preferably a nutritional fiber, both of which are well
15 known to be beneficiary to human health.

4. DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is of a butterlike composition comprising water, unmodified vegetable oil and a hydrocolloid, which is a fiber, which comprises at least about 18 weight
20 percent of said composition, which can be used for replacing saturated fatty acid rich butterlike products such as butter and margarine in human diet. Specifically, the present invention can be used to provide a novel unmodified vegetable oil based butterlike product, which preserves the oil's quality, its original molecular structure, its biological characteristics and its nutritional value, which product is also enriched with a fiber,
25 preferably a nutritional fiber.

The principles and operation of a butterlike composition according to the present invention may be better understood with reference to the accompanying descriptions and examples.

Before explaining at least one embodiment of the invention in detail, it is to be
30 understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the examples. The invention is capable of other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as
35 limiting.

Thus, according to the present invention there is provided a butterlike composition which includes a solidified emulsion of at least one vegetable oil, water and at least one hydrocolloid which is a fiber. According to a preferred embodiment, the composition contains at least about 18 weight percent fiber. According to certain embodiments, the
5 butterlike composition contains about 18-60 weight percent fiber, preferably about 20-40 weight percent fiber, more preferably about 20-30 weight percent fiber. According to yet another preferred embodiment, the butterlike composition contains about 36% weight percent fiber. The composition according to the present invention has butterlike properties, e.g., texture, color, appearance, stability and spreadability.

10 As used herein in the specification and in the claims below, the term "butterlike" refers to a composition featuring properties similar to those of butter, margarine, spreads and the like.

As used herein in the specification and in the claims below, the term "vegetable oil" refers to oil extracted from any part of any vegetation (plant), in particular plant seeds.

15 Thus, any vegetable oil may be used as the source of oil for the butterlike composition of the present invention. Presently preferred vegetable oils include, but are not limited to, olive oil, cocoa oil, sunflower seed oil, soybean oil, corn oil, sesame oil, peanut oil, coconut oil and palm oil.

Most vegetable oils are liquids at ambient temperature. Of the above list of oils
20 these include the olive oil, cocoa oil, sunflower seed oil, soybean oil, corn oil, sesame oil and peanut oil.

However, other vegetable oils, such as coconut oil and palm oil, due to higher saturation of their fatty acids, are semisolids at room temperature.

In these cases the oil/fiber ratio in the respective butterlike composition is
25 appropriately reduced, i.e., is in the lower end of the preferred range at about 18-30 weight percent, more preferably at about 18-25 weight percent, such that the resulting composition features butterlike properties.

A unique feature of the butterlike composition of the present invention is that the vegetable oil therein maintains its chemical make-up while in the composition. In other
30 words, the vegetable oil is not diluted with more saturated oils, nor it is undergoing hydrogenation to render it more saturated. As further detailed hereinunder, solidification of the oil(s) employed into a butterlike composition is effected according to the present invention by the fiber.

Without in any way limiting the scope of the present invention, at present, olive oil,
35 either extra virgin (cold press) or refined (solvent extraction), is the preferred source of oil

for the butterlike composition of the present invention due to its inherent benefits to human health.

According to a preferred embodiment of the present invention the butterlike composition further includes one or more of the following substances: emulsifier, stabilizer, flavor, preservative, colorant, acid, salt, spices and/or other food additives.

Lecithin, which is originated from soybean seeds, is typically used as an emulsifier for mixing together otherwise non-mixable substances such as oil and water. Lecithin is presently the preferred emulsifier for emulsifying the butterlike composition according to the present invention. In another embodiment, the emulsifier is sucrose stearate, which is a non-ionic surfactant sold under the trade name Sisterna SP70 (Sisterna C.V., the Netherlands). Depending on the application, emulsifiers, e.g. lecithin, sucrose stearate, etc., are typically employed at low weight percent concentrations, e.g., few, one or less than one weight percent.

Hydrocolloids are gelating agents which are employed as emulsifiers, stabilizers and thickeners of foods. When used as emulsifiers and/or stabilizers hydrocolloids are employed at low weight percent concentrations, e.g., fraction of weight percents to few weight percents, depending on the application and hydrocolloid of choice. On the other hand, when hydrocolloids are used as thickeners (solidifiers) they are employed at higher weight percent concentrations, e.g., typically above 10 weight percent and more. Different hydrocolloids have different properties and therefore skills are required for selecting the appropriate hydrocolloid(s) and their respective concentration(s) for given applications.

Hydrocolloids derived from eight different sources are known. These include (a) natural seaweed extracts, such as, but not limited to, carrageenan, alginates, agar, agarose, fucellan and xanthan gum; (b) natural seed gums, such as, but not limited to, guar gum, locust bean gum, tara gum, tamarind gum and psillium gum; (c) natural plant exudates, such as, but not limited to, gum arabic, tragacanth, karaya and ghatti; (d) natural fruit extracts, such as, but not limited to, low and high methoxyl pectins; (e) animal skin and bone extracts, such as, but not limited to, gelatin A and B and hydrolyzed gelatin; (f) bio-synthetic gums, such as, but not limited to, xanthan, gellan, curdian and pullulan; (g) starches, such as, but not limited to, natural starch and chemically, physically and enzymatically modified starch; and (h) fibers, such as, but not limited to, alpha cellulose, CMC, HPC, HPMC, MC, microcrystalline cellulose and inulin. Inulin is an example of a nutritional fiber.

As used herein in the specification and claims below, the term "nutritional fiber" and its equivalent term "dietary fiber" both refer to fibrous carbonaceous substances which resist

hydrolysis by human alimentary enzymes but are hydrolyzed and fermented by the gastrointestinal microflora.

As nutritional fiber consumption is known to have beneficial effect on human health, such as reducing blood cholesterol, assisting in digestion, and preventing cancer of the intestine and colon. Nutritional (or dietary) fiber hydrocolloids are presently the hydrocolloid fibers of choice for solidifying the butterlike composition of the present invention, preferably used at a final amount of at least 18 weight percent, and more preferably 20 weight percent or more.

Inulin, which is a nutritional fiber, is a natural polymer of fructose found in numerous plants, such as, but not limited to, garlic, salsify, onion and chicory. It includes a chain of fructose units with (β 2-1 bonds), which ends with a glucose unit. Chicory inulin, is commercially available from COSURCA S.A., Belgium, under the name FIBRULINETM or FUBRULINETM. FIBRULINETM includes long chain inulin and it is therefore gelating only post heating, whereas FUBRULINETM includes short chain inulin (instant inulin) and it is therefore readily gelating at ambient temperature.

Without limiting the scope of the present invention, inulin is presently the nutritional fiber of choice for solidifying the butterlike composition according to the present invention.

In preferred embodiments inulin is employed in 18-60, more preferably 20-45, most preferably 20-40 weight percent, depending on the level of saturation of the vegetable oil(s) of choice and the hardness desired.

Gum arabic is a natural food additive obtained from certain varieties of *acacia*. It is tasteless, odorless and it is frequently used in commercial food processing to thicken, emulsify and/or stabilize foods such as candy, ice cream and sweet syrup.

Guar gum is a gummy substance obtained from plants of the *legume* genera. Guar gum is typically used as a thickener and/or stabilizer in commercial food processing.

Xanthan gum is produced by fermentation of corn sugar. It is typically used as a thickener, emulsifier and/or stabilizer of foods such as salad as dressings.

Gum arabic, guar gum, xanthan gum and/or pectin are preferably used in combination in the preferred butterlike composition according to the present invention as emulsion stabilizers. They are therefore used at low concentrations, e.g., below one weight percent (see Table 1 below).

According to a preferred embodiment of the present invention, the flavor is selected from the following: butter flavor in either dry or liquid form (e.g., available from C. Melchers and Co.), butter vanilla flavor. (e.g., available from C. Melchers and Co.), olive flavor (e.g., available from Frotarum Ltd., Israel and Baltimore Spices, U.S.), cocoa or

chocolate flavor, and/or vegetable flavor, such as roasted mushroom flavor, broccoli flavor, celery flavor, grilled eggplant flavor, asparagus flavor, green bell pepper flavor, raw carrot flavor, fried onion flavor, roasted garlic flavor or artichoke flavor (e.g., available from Aromes De Bretagne, France).

- 5 According to another preferred embodiment of the present invention the preservative is selected from the following: potassium sorbate, sodium benzoate, lactic acid, propionic acid and citric acid. The preservative is preferably a natural anti-oxidant.

According to still another preferred embodiment of the present invention the colorant is selected from the following: carotenoids, such as, but not limited to, beta
10 carotene.

According to yet another preferred embodiment of the present invention the acid is selected from the following: citric acid and glucono delta lactone (GDL). The acid is employed to keep the pH of the butterlike composition according to the present invention below pH 6, preferably below pH 5, more preferably below pH 4, most preferably between
15 pH 2.5 and pH 4.

According to still another preferred embodiment of the present invention the salt is selected from the following: sodium chloride and potassium chloride. The salt is used to provide salty butterlike compositions.

According to yet another preferred embodiment of the present invention, the
20 butterlike composition further comprises at least one dietary supplement, optionally in addition to a dietary fiber. In a highly preferred embodiment, the dietary supplement is red yeast. By definition, red yeast is a mixture of fungal species of the genus *Monascus*. WO 98/1477 teaches that certain strains of *Monascus spp.* contain lovastatin. Lovastatin is a competitive inhibitor of the cholesterol biosynthesis pathway. Red yeast has been used in
25 traditional Chinese medicine for the treatment of indigestion, diarrhea and heart and abdominal pains and in recent times as food coloring due to the red and yellow pigments it produces. According to this preferred embodiment of the present invention, red yeast, in particular red yeast containing a *Monascus* strain that contains lovastatin, is further incorporated as a dietary supplement into the butterlike compositions at an amount ranging
30 from 1-24g/kg, or 0.1-2.4 weight percent. In one mode of this embodiment, the pigmentation of the red yeast may be left intact for butterlike compositions, e.g. those in which the red color is not visible, such as those compositions comprising low amounts of red yeast and those compositions in which the red yeast pigmentation is masked (for example chocolate flavored compositions), or those in which the red color is visible and
35 aesthetically acceptable, such as yellowish or whitish butterlike compositions. In yet

another mode of this embodiment, the pigmentation of the red yeast is removed prior to its addition to the butterlike composition, mainly for aesthetic reasons, for example upon addition to a greenish colored butterlike composition comprising extra virgin olive oil.

The presently most preferred butterlike compositions in accordance with the teachings of the present invention are described under Example 1 below (see Table 1). Example 1 further provides a comparison between the preferred butterlike compositions of the present invention and prior art butterlike products (see Tables 2 and 3).

One of the features and advantages of the butterlike composition according to the present invention is its low fat content. Compositions including as low as about 20 weight percent, preferably about 15-25 weight percent, more preferably about 5-30 weight percent fat are readily prepared following the method steps described hereinunder. As such, a composition according to the present invention differs and is advantageous over prior art butterlike products which contain about 40-80 weight percent fat (see Tables 1-3 below).

Similarly, compositions including less than about 5 weight percent, preferably less than about 4 weight percent, more preferably, less than about 3 weight percent, most preferably, about 2 weight percent or less saturated fat can be readily prepared by appropriate oil selection and fat content selection, because, as already stated hereinabove, unmodified vegetable oil is the sole source for oil in the butterlike composition according to the present invention (see Table 2 below).

Because of the low fat content and the high content of dietary fibers, compositions providing 50-250 Calories (kilocalories) per 100 grams are readily manufacturable, as compared with about 350-700 Calories and more per 100 grams of prior art butterlike products (see Tables 2-3 below).

One method of preparing a butterlike composition according to the present invention preferably includes the following method steps, in which, in a first step at least one vegetable oil is mixed with at least one emulsifier for obtaining an oil-emulsifier mixture.

Thereafter, water is added to the oil-emulsifier mixture at a rate permitting formation of emulsion.

Then, an emulsion stabilizer is added to the emulsion thus formed for obtaining a stabilized emulsion.

Afterwards, a fiber is added to the stabilized emulsion for obtaining a fiber containing emulsion.

Finally, the fiber containing emulsion is poured into molds in a process known in the art as "filling", and the fiber containing emulsion is allowed to solidify, thereby the butterlike composition, having butterlike properties, is obtained.

The method steps herein described are preferably executed at ambient temperature, using ingredients equilibrated to ambient temperature.

Another method of preparing a butterlike composition according to the present invention includes mixing at least one fiber with water and slowly raising the temperature of said mixture until the fiber is dissolved or dispersed. Thereafter, at least one vegetable oil and one emulsifier are slowly added to the fiber-water mixture whilst mixing until a stabilized emulsion is obtained. A stabilizer is optionally added with mixing. Then, while mixing the emulsion is allowed to cool; optionally flavoring and coloring are added to the cooled emulsion. The emulsion is then poured into molds and allowed to solidify, thereby obtaining the butterlike composition.

Preferably, the first step of mixing the water and fiber is executed at 25°C. Preferably, the mixture is then heated to 90-100°C. After the water-fiber mixture is mixed with oil and emulsifier, the resultant emulsion is preferably cooled to 60-70°C.

According to a preferred embodiment of the invention, substances, such as but not limited to, flavor, preservative, colorant, acid, salt and other food additives are added to the composition. Such additives are preferably added only after the emulsion is stabilized, so as to avoid destabilization effects.

It will be appreciated by one ordinarily skilled in the art that following the above method steps the oil added to the composition maintains its chemical make-up in the solidified butterlike product. Thus, the oil's quality, its original molecular structure, its biological characteristics and its nutritional value are preserved throughout the process and in the final product, the novel butterlike composition.

Thus, the present invention provides a butterlike composition which is advantageous for human consumption when compared with prior art butterlike products, such as butter and margarine.

First, the use of olive oil has many advantages over the use of other oils or fats. This is supported by studies which confirm that olive oil rich diet, especially of cold press olive oil (extra virgin), decreases blood cholesterol levels, reduces the LDL/HDL ratio and thereby reduces the likelihood of developing cardiovascular diseases associated with high blood cholesterol levels and LDL/HDL ratios.

Second, the present invention provides a butterlike composition which is very low in fat and in Calories content as is compared with accepted butterlike products. As such, the butterlike composition of the present invention is not only healthier, but it is desirous according to the wide spread "thin is beautiful" trend of the Western world.

Third, the present invention provides a butterlike composition which is, as compared with known solid fat based foods, exceptionally low in saturated fat, yet it still maintains its butterlike properties.

Fourth, the present invention provides a butterlike composition with very high content of nutritional fibers, which are known to have beneficiary effects on human health, including in reducing blood cholesterol levels, assisting in digestive processes, and reducing the likelihood of developing intestine and colon cancers.

Fifth, the present invention provides a butterlike composition devoid of harmful fat trans acids, which are present in hydrogenated butterlike compositions such as margarine.

Thus, according to the present invention there is provided a butterlike composition which is low in total fat content, Calories and saturated fat as compared with prior art products and which includes unmodified fat derived from vegetable oils and nutritional fibers both are beneficiary to human health.

5. EXAMPLES

Reference is now made to the following examples, which together with the above descriptions, illustrate the invention in a non limiting fashion.

EXAMPLE 1

Olive oil, either extra virgin or purified (250 grams) was mixed with lecithin (7 grams) in a mixer (Stephan, Germany) revolving at 1,400 rpm for 2.5 minutes. Thereafter, the revolution speed was raised to 3,000 rpm and water (preboiled, 600 ml) was gradually added, ensuring the formation of emulsion. While still at high speed, 3 grams of xanthan gum and 5 grams of pectin were added to the resulted emulsion. Then, citric acid (1 gram), glucono delta lactone (GDL, 1 gram), potassium sorbate (1 gram), NaCl (20 gram), beta-carotene (0.2 gram) and natural antioxidant were added and the mixture was mixed for one additional minute at the high speed. Thereafter 500 grams of FUBRULINE™ were added and the mixture was mixed for additional five minutes at the high speed. Upon adding the FUBRULINE™ the emulsion thickened, then, after the FUBRULINE™ dissolved in the water fraction, it reliquified. At this stage the mixture was poured into molds and was left to solidify for several minutes. The resulting solidified composition featured butterlike properties. All steps were performed at ambient temperature (which was about 20°C) using ingredients equilibrated to ambient temperature. The resulting product was stored in the refrigerator. Table 1 below summarizes the

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composition, process parameters, and calculated and measured characteristics of the resulting composition.

The resulting composition had butterlike texture and appearance and it behaved like butter and margarine when it was used as a spread, for baking and for frying, giving the
5 resulting foods exquisite and unique flavor of olive oil.

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TABLE 1

	Extra virgin olive oil	Refined olive oil
COMPOSITION		
	43.25 w%	43.25 w%
5	0.00 w%	18.02 w%
	18.02 w%	0.00 w%
	36.04 w%	36.04 w%
	0.22 w%	0.22 w%
	0.43 w%	0.43 w%
10	0.36 w%	0.36 w%
	0.07 w%	0.07 w%
	0.07 w%	0.07 w%
	0.07 w%	0.07 w%
	1.44 w%	1.44 w%
15	0.01 w%	0.01 w%
PROCESS PARAMETERS		
	20	20
	20	20
	20	20
20	2-8	2-8
CALCULATED CHARACTERISTICS		
	18.45 w%	18.45 w%
	36.44 w%	36.44 w%
	4.60 w%	4.60 w%
	34.20 w%	34.20 w%
25	MEASURED CHARACTERISTICS AT 25°C	
	140-150	140-150
	3.3-3.6	3.3-3.6
	SOFT SOLID	SOFT SOLID
	STABLE	STABLE
30	YELLOWISH-WHITISH	YELLOWISH-WHITISH

* Penetration force was determined using a penetrometer.

** pH was determined using a pH meter in the liquid state.

*** Hardness was compared to commercial margarine under the same temperature.

Tables 2-3 below compare various parameters of butter, margarine, light margarine and mayonnaise and an exemplary butterlike composition of the present invention. The health benefits inherent to the butterlike composition of the present invention are self evident.

TABLE 2

Product Parameter:	Butter	Margarine	Light Margarine	Mayonnaise	Butterlike composition
Energy content (Cal. per 100 grams)	717	742	345	659	210
Source of fat	Milk fat	Soy/corn oil	Soy/corn oil	Soy oil	Olive oil
Fat (w%)	81	82	39	71	22
Saturated fat (w%)	50	15	7	10	2.1
Treatment of fat	Purification	Hydrogenation	Hydrogenation	Purification	-
Molecular structure	Mostly saturated .50%	Fat trans acid present	Fat trans acid present	Mostly not saturated	Mostly not saturated
Polyunsaturated fatty acids (w%)	23	39	15	15	14
Polysaturated fatty acids (w%)	3	25	13	41	1.6
Presence of natural anti oxidants	Low	Low	Low	Low	High
Nutritional fibers (w%)	0	0	0	0	28
Cholesterol (mg per 100 grams)	219	0	0	36	0
Uses	Baking, spreads frying	Baking, spreads frying	Baking, spreads frying	Spreads, sauces	Baking, spreads frying
Carbohydrates (w%)	0.06	0	0.4	3	3
Kosher	Dairy	Parve	Parve	Parve	Parve

TABLE 3

Parameter: Product:	Energy (Cal. per 100 grams)	Total fat (w %)	Saturated fat (w %)	Cholesterol (mg per 100 grams)	Nutritional fibers (w %)	Fat source
Margarine	742	82	15.00	0	0	Soy/corn oil
Butter	717	81	50.00	219	0	Milk fat
Mayonnaise	659	71	10.00	36	0	Soy oil
Butterlike composition	210	22	2.1	0	28	Olive oil

EXAMPLE 2

The following table illustrates butterlike compositions according to the present invention to which red yeast was added as a dietary supplement.

TABLE 4

COMPOSITION	Extra virgin olive oil		Refined olive oil	
	g	w%	g	w%
WATER	43.25	42.41	43.25	42.41
REFINED OLIVE OIL	0.00	0.00	18.02	17.67
EXTRA VIRGIN OLIVE OIL	18.02	17.67	0.00	0.00
FUBRULINE™ INSTANT	36.04	35.34	36.04	35.34
Xanthan GUM	0.22	0.22	0.22	0.22
RED YEAST	2.00	1.96	2.00	1.96
LECITHIN	0.43	0.42	0.43	0.42
PECTIN 450RF	0.36	0.35	0.36	0.35
GDL	0.07	0.07	0.07	0.07
CITRIC ACID	0.07	0.07	0.07	0.07
POTASSIUM SORBATE	0.07	0.07	0.07	0.07
SALT	1.44	1.41	1.44	1.41
BETA-CAROTENE	0.01	0.01	0.01	0.01
TOTAL	101.98g	100 w%	101.98g	100 w%
PROCESS PARAMETERS				
WATER TEMPERATURE °C	20		20	
ADDITION DRY MATTER AT °C	20		20	
FILLING TEMPERATURE °C	20		20	
STORAGE TEMPERATURE °C	2-8		2-8	
CALCULATED CHARACTERISTICS				
FAT CONTENT	18.45 w%		18.45 w%	
DRY MATTER	36.44 w%		36.44 w%	
CARBOHYDRATE CONTENT	4.60 w%		4.60 w%	
FIBER CONTENT	34.20 w%		34.20 w%	

EXAMPLE 3

Extra virgin olive oil was mixed in individual experiments with the ingredients and under the process parameters listed in Tables 5-18. The calculated and measured characteristics of the resulting compositions are provided as well.

The resulting compositions were inferior in their butterlike properties as compared with those of the compositions of Example 1 above, however, some of these compositions can be used as mayonnaise like soft spreads, gel type spreads, etc.

TABLE 5

Composition		
10	Water (w%)	42.80
	Extra virgin olive oil (w%)	20.00
	FUBRULINE™ INSTANT (w%)	35.00
	Xanthan gum (w%)	0.10
	Flavor (w%)	1.90
15	Citric acid (w%)	0.04
	Potassium sorbate (w%)	0.20
Process parameters		
	Water temperature °C	80
	Addition of dry matter at °C	80
20	Pasteurization temperature °C	80
	Pasteurization time (min)	5
	Filling temperature °C	80
	Storage temperature °C	20
Calculated characteristics		
	Fat content (w%)	20.00
25	Dry matter (w%)	36.57
	Carbohydrate content (w%)	4.01
	Fiber content (w%)	31.50
Measured characteristics at 25 °C		
	Penetration force (G)	130
30	pH	2.9
	Hardness	Soft
	Appearance	Stable
	Color	Yellow
	Spreadability	Smooth

TABLE 6

	Composition	
	Water (w%)	61.30
	Extra virgin olive oil (w%)	20.00
	FIBRULINE™ LC (w%)	16.50
5	Xanthan gum (w%)	0.10
	Flavor (w%)	1.90
	Citric acid (w%)	0.04
	Potassium sorbate (w%)	0.20
	Process parameters	
10	Water temperature °C	80
	Addition of dry matter at °C	80
	Pasteurization temperature °C	80
	Pasteurization time (min)	5
	Filling temperature °C	80
	Storage temperature °C	20
15	Calculated characteristics	
	Fat content (w%)	20.00
	Dry matter (w%)	18.22
	Carbohydrate content (w%)	2.24
	Fiber content (w%)	15.68
20	Measured characteristics at 25 °C	
	Penetration force (G)	100
	pH	2.9
	Hardness	Soft
	Appearance	EW of drops
	Color	Yellow
25	Spreadability	Smooth

TABLE 7

30	Composition	
	Water (w%)	56.80
	Extra virgin olive oil (w%)	20.00
	FIBRULINE™ LC (w%)	21.00
	Xanthan gum (w%)	0.10
	Flavor (w%)	1.90
35	Citric acid (w%)	0.04

	Potassium sorbate (w%)	0.20
	Process parameters	
	Water temperature °C	80
	Addition of dry matter at °C	80
5	Pasteurization temperature °C	80
	Pasteurization time (min)	5
	Filling temperature °C	80
	Storage temperature °C	20
	Calculated characteristics	
10	Fat content (w%)	20.00
	Dry matter (w%)	22.61
	Carbohydrate content (w%)	2.33
	Fiber content (w%)	19.95
	Measured characteristics at 25 °C	
	Penetration force (G)	140
15	pH	2.9
	Hardness	Soft
	Appearance	EW of drops
	Color	Yellow
	Spreadability	Smooth
20		

TABLE 8

	Composition	
	Water (w%)	52.80
25	Extra virgin olive oil (w%)	20.00
	FIBRULINE™ LC (w%)	25.00
	Xanthan gum (w%)	0.10
	Flavor (w%)	1.90
	Citric acid (w%)	0.04
30	Potassium sorbate (w%)	0.20
	Process parameters	
	Water temperature °C	80
	Addition of dry matter at °C	80
	Pasteurization temperature °C	80
	Pasteurization time (min)	5
35	Filling temperature °C	80

	Storage temperature °C	20
	Calculated characteristics	
	Fat content (w%)	20.00
	Dry matter (w%)	26.51
5	Carbohydrate content (w%)	2.41
	Fiber content (w%)	23.75
	Measured characteristics at 25 °C	
	Penetration force (G)	240-250
	pH	2.9
10	Hardness	Gelled
	Appearance	EW of drops
	Color	Yellow
	Spreadability	Smooth

15 **TABLE 9**

	Composition	
	Water (w%)	56.80
	Extra virgin olive oil (w%)	20.00
	FIBRULINE™ LC (w%)	25.00
20	Xanthan gum (w%)	0.10
	Flavor (w%)	1.90
	Citric acid (w%)	0.04
	Potassium sorbate (w%)	0.20
	Process parameters	
25	Water temperature °C	80
	Addition of dry matter at °C	80
	Pasteurization temperature °C	80
	Pasteurization time (min)	5
	Filling temperature °C	70
30	Storage temperature °C	8
	Calculated characteristics	
	Fat content (w%)	20.00
	Dry matter (w%)	22.61
	Carbohydrate content (w%)	2.33
	Fiber content (w%)	19.95
35	Measured characteristics at 25 °C	

	Penetration force (G)	120-125
	pH	2.9
	Hardness	Soft gel
	Appearance	Stable
5	Color	White
	Spreadability	Very smooth

TABLE 10

10	Composition	
	Water (w%)	52.80
	Extra virgin olive oil (w%)	20.00
	FIBRULINE™ LC (w%)	25.00
	Xanthan gum (w%)	0.10
15	Flavor (w%)	1.90
	Potassium sorbate (w%)	0.20
	Process parameters	
	Water temperature °C	80
	Addition of dry matter at °C	75
	Pasteurization temperature °C	75
20	Pasteurization time (min)	7
	Filling temperature °C	70
	Storage temperature °C	8
	Calculated characteristics	
	Fat content (w%)	20.00
25	Dry matter (w%)	26.51
	Carbohydrate content (w%)	2.41
	Fiber content (w%)	23.75
	Measured characteristics at 25 °C	
	Penetration force (G)	200-220
	pH	2.9
30	Hardness	Gelled
	Appearance	Stable
	Color	Yellow
	Spreadability	Smooth

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TABLE 11

	Composition	g	w%
5	Water	42.80	61.58
	Extra virgin olive oil	20.00	28.78
	Gum arabic	3.00	4.32
	Xanthan gum	1.00	1.44
	Flavor	1.90	2.73
	Citric acid	0.40	0.58
	Potassium sorbate	0.40	0.58
10	Total	69.5g	100%
Process parameters			
	Water temperature °C	80	
	Addition of dry matter at °C	75	
	Pasteurization temperature °C	75	
15	Pasteurization time (min)	7	
	Filling temperature °C	70	
	Storage temperature °C	8	
Calculated characteristics			
	Fat content (w%)	28.78	
	Dry matter (w%)	8.27	
20	Measured characteristics at 25 °C		
	Penetration force (G)	120	
	pH	2.9	
	Hardness	Gelled	
	Appearance	Stable	
25	Color	White	
	Spreadability	Smooth	

TABLE 12

30	Composition	g	w%
	Water	42.80	60.71
	Extra virgin olive oil	20.00	28.37
	Gum arabic	4.00	5.67
	Xanthan gum	1.00	1.42
35	Flavor	1.90	2.70
	Citric acid	0.40	0.57

	Potassium sorbate	0.40	0.57
	Total	70.5g	100%
	Process parameters		
	Water temperature °C	80	
5	Addition of dry matter at °C	75	
	Pasteurization temperature °C	75	
	Pasteurization time (min)	7	
	Filling temperature °C	70	
	Storage temperature °C	8	
10	Calculated characteristics		
	Fat content (w%)	28.37	
	Dry matter (w%)	9.57	
	Measured characteristics at 25 °C		
	Penetration force (G)	110	
	pH	2.9	
15	Hardness	Gelled	
	Appearance	Stable	
	Color	White	
	Spreadability	Smooth	

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TABLE 13

	Composition	g	w%
	Water (g)	42.80	59.03
	Extra virgin olive oil (g)	20.00	27.59
25	Gum arabic (g)	4.00	5.52
	Xanthan gum (g)	1.00	1.38
	Starch (g)	2.00	2.76
	Flavor (g)	1.90	2.62
	Citric acid (g)	0.40	0.55
30	Potassium sorbate (g)	0.40	0.55
	Total	72.5g	100%
	Process parameters		
	Water temperature °C	80	
	Addition of dry matter at °C	75	
	Pasteurization temperature °C	80	
35	Pasteurization time (min)	5	

	Filling temperature °C	80
	Storage temperature °C	20
	Calculated characteristics	
	Fat content (w%)	27.59
5	Dry matter (w%)	12.07
	Measured characteristics at 25 °C	
	Penetration force (G)	120
	pH	3.4
	Hardness	Soft
10	Appearance	Stable
	Color	White
	Spreadability	Coarse

TABLE 14

15	Composition	g	w%
	Water	42.80	59.44
	Extra virgin olive oil	20.00	27.78
	Gum arabic	4.00	5.56
	Xanthan gum	1.00	1.39
20	Gelatin	1.50	2.08
	Flavor	1.90	2.64
	Citric acid	0.40	0.56
	Potassium sorbate	0.40	0.56
	Total	72.0 g	100%
25	Process parameters		
	Water temperature °C	80	
	Addition of dry matter at °C	75	
	Pasteurization temperature °C	80	
	Pasteurization time (min)	5	
30	Filling temperature °C	80	
	Storage temperature °C	20	
	Calculated characteristics		
	Fat content (w%)	27.78	
	Dry matter (w%)	11.46	
	Measured characteristics at 25 °C		
35	Penetration force (G)	160	

	pH	3
	Hardness	Gelled
	Appearance	Stable
	Color	White
5	Spreadability	Smooth

TABLE 15

	Composition	g	w%
10	Water	42.80	59.03
	Extra virgin olive oil	20.00	27.59
	Gum arabic	4.00	5.52
	Xanthan gum	1.00	1.38
	Carrageenan	2.00	2.76
15	Flavor	1.90	2.62
	Citric acid	0.40	0.55
	Potassium sorbate	0.40	0.55
	Total	72.5g	100%
	Process parameters		
20	Water temperature °C	80	
	Addition of dry matter at °C	75	
	Pasteurization temperature °C	80	
	Pasteurization time (min)	5	
	Filling temperature °C	80	
	Storage temperature °C	20	
25	Calculated characteristics		
	Fat content (w%)	27.59	
	Dry matter (w%)	12.07	
	Measured characteristics at 25 °C		
	Penetration force (G)	140	
30	pH	3.2	
	Hardness	Gelled	
	Appearance	Stable	
	Color	White	
	Spreadability	Smooth	

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TABLE 16

Composition		g	w%
	Water	42.80	59.03
5	Extra virgin olive oil	20.00	27.59
	Gum arabic	4.00	5.52
	Xanthan gum	1.00	1.38
	Alginate	2.00	2.76
	Flavor	1.90	2.62
10	Citric acid	0.40	0.55
	Potassium sorbate	0.40	0.55
	Total	72.5g	100%
Process parameters			
	Water temperature °C	80	
	Addition of dry matter at °C	75	
15	Pasteurization temperature °C	80	
	Pasteurization time (min)	5	
	Filling temperature °C	80	
	Storage temperature °C	20	
Calculated characteristics			
20	Fat content (w%)	27.59	
	Dry matter (w%)	12.07	
Measured characteristics at 25 °C			
	Penetration force (G)	170	
	pH	3	
25	Hardness	Gelled	
	Appearance	Stable	
	Color	White	
	Spreadability	Smooth	

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TABLE 17

Composition		g	w%
	Water	42.80	58.63
	Extra virgin olive oil	20.00	27.40
	Gum arabic	4.00	5.48
35	Xanthan gum	1.00	1.37

	LBG	2.50	3.42
	Flavor	1.90	2.60
	Citric acid	0.40	0.55
	Potassium sorbate	0.40	0.55
5	Total	73g	100%
	Process parameters		
	Water temperature °C	80	
	Addition of dry matter at °C	75	
	Pasteurization temperature °C	80	
10	Pasteurization time (min)	5	
	Filling temperature °C	80	
	Storage temperature °C	20	
	Calculated characteristics		
	Fat content (g)	27.40	
	Dry matter (g)	12.67	
15	Measured characteristics at 25 °C		
	Penetration force (G)	180	
	pH	3.2	
	Hardness	Gelled	
	Appearance	Stable	
20	Color	White	
	Spreadability	Smooth	

TABLE 18

	Composition	g	w%
25	Water	42.80	60.03
	Extra virgin olive oil	20.00	28.05
	Gum arabic	4.00	5.61
	Xanthan gum	1.80	2.52
	Flavor	1.90	2.66
30	Citric acid	0.40	0.56
	Potassium sorbate	0.40	0.56
	Total	71.3g	100%
	Process parameters		
	Water temperature °C	80	
35	Addition of dry matter at °C	75	
	Pasteurization temperature °C	80	

	Pasteurization time (min)	5
	Filling temperature °C	80
	Storage temperature °C	20
	Calculated characteristics	
5	Fat content (w%)	28.05
	Dry matter (w%)	10.59
	Measured characteristics at 25 °C	
	Penetration force (G)	160
	pH	3.2
10	Hardness	Gelled
	Appearance	Stable
	Color	White
	Spreadability	Smooth

Although the invention has been described in conjunction with specific
15 embodiments thereof, it is evident that many alternatives, modifications and variations will
be apparent to those skilled in the art. Accordingly, it is intended to embrace all such
alternatives, modifications and variations that fall within the spirit and broad scope of the
appended claims.

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WHAT IS CLAIMED IS:

1. A butterlike composition comprising a solidified emulsion of at least one vegetable oil, water and at least one fiber at an amount of at least 18% weight percent said composition having butterlike properties.
2. The butterlike composition of claim 1, wherein the fiber is at an amount of about 18-60 weight percent.
3. The butterlike composition of claim 1, wherein said at least one vegetable oil maintains its chemical make-up while in said composition.
4. The butterlike composition of claim 1, further comprising at least one substance selected from the group consisting of emulsifier, stabilizer, flavor, preservative, colorant, acid and salt.
5. The butterlike composition of claim 1, wherein said at least one vegetable oil is selected from the group consisting of olive oil, cocoa oil, sunflower seed oil, soybean oil, corn oil, sesame oil, peanut oil, coconut oil and palm oil.
6. The butterlike composition of claim 1, wherein said at least one vegetable oil is olive oil.
7. The butterlike composition of claim 1, wherein said at least one vegetable oil is a liquid oil at ambient temperature.
8. The butterlike composition of claim 1, wherein said at least one fiber is a nutritional fiber.
9. The butterlike composition of claim 8, wherein said nutritional fiber is inulin.
10. The butterlike composition of claim 9, wherein said inulin is selected from the group consisting of instant gelling inulin and long chain inulin.

11. The butterlike composition of claim 1, wherein the fiber is cellulose.
12. The butterlike composition of claim 12, wherein the cellulose is selected from the group consisting of alpha cellulose, CMC, HPC, HPMC, MC and microcrystalline
5 cellulose.
13. The butterlike composition of claim 1, further comprising at least one dietary supplement.
- 10 14. The butterlike composition of claim 13, wherein said dietary supplement is red yeast.
- 15 15. The butterlike composition of claim 14, wherein red yeast is at an amount of about 0.1-2.4 weight percent.
- 16 16. The butterlike composition of claim 3, wherein said flavor is independently selected from the group consisting of butter flavor, butter vanilla flavor, olive flavor, cocoa or chocolate flavor, roasted mushroom flavor, broccoli flavor, celery flavor, grilled eggplant flavor, asparagus flavor, green bell pepper flavor, raw carrot flavor, fried onion flavor,
20 roasted garlic flavor or artichoke flavor, said preservative is independently selected from the group consisting of potassium sorbate, sodium benzoate, lactic acid, propionic acid and citric acid, said colorant is independently selected from the group consisting of carotenoids, riboflavin, curcumin, beet powder, red color MN and spinach oleoresin, said acid is independently selected from the group consisting of citric acid and glucono delta lactone,
25 whereas said salt is independently selected from the group consisting of sodium chloride and potassium chloride.
17. The butterlike composition of claim 3, wherein said emulsifier is selected from the group consisting of lecithin and sucrose stearate.
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18. The butterlike composition of claim 3, wherein said stabilizer is selected from the group consisting of natural seaweed extract, natural seed gum, natural plant exudate, natural fruit extract, animal skin and bone extract, bio-synthetic gum, and starch.
- 35 19. The butterlike composition of claim 13, wherein:

- 5 (a) said natural seaweed extract is independently selected from the group consisting of carrageenan, alginates, agar, agarose, fucellan and xanthan gum;
- (b) said natural seed gum is independently selected from the group consisting of guar gum, locust bean gum, tara gum, tamarind gum and psillium gum;
- (c) said natural plant exudate is independently selected from the group consisting of gum arabic, tragacanth, karaya and ghatti;
- (d) said natural fruit extract is independently selected from the group consisting of low and high methoxyl pectins;
- 10 (e) said animal skin and bone extract is independently selected from the group consisting of gelatin A and B and hydrolyzed gelatin;
- (f) said bio-synthetic gum is independently selected from the group consisting of xanthan, gellan, curdian and pullulan; and
- (g) said starch is independently selected from the group consisting of natural starch and chemically, physically and enzymatically modified starch.
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20. The butterlike composition of claim 1, comprising about 5-30 weight percent fat.

20 21. The butterlike composition of claim 20 comprising less than 5 weight percent saturated fat.

22. The butterlike composition of claim 20 comprising ingredients providing 50-250 Calories per 100 grams.

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23. The butterlike composition of claim 21 comprising ingredients providing 50-250 Calories per 100 grams.

24. The butterlike composition of claim 1, comprising less than 5 weight percent saturated fat.

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25. The butterlike composition of claim 24 comprising ingredients providing 50-250 Calories per 100 grams.

35 26. The butterlike composition of claim 1, comprising ingredients providing

50-250 Calories per 100 grams.

27. The butterlike composition of claim 1, comprising about 15-25 weight percent oil and 20-40 weight percent fiber.

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28. The butterlike composition of claim 27, comprising about 20-30 weight percent fiber.

29. A method of preparing a butterlike composition comprising the steps of:

10 (a) mixing at least one vegetable oil with at least one emulsifier to obtain an oil-emulsifier mixture;

(b) while mixing said oil-emulsifier mixture, adding water to said oil-emulsifier mixture at a rate permitting formation of an emulsion;

(c) while mixing said emulsion, adding an emulsion stabilizer to said emulsion

15 to obtain a stabilized emulsion;

(d) while mixing said stabilized emulsion, adding to said stabilized emulsion at least one hydrocolloid to obtain a hydrocolloid containing emulsion; and

(e) pouring said hydrocolloid containing emulsion into molds and allowing said hydrocolloid containing emulsion to solidify, thereby obtaining the butterlike

20 composition.

30. The method of claim 29, wherein steps (a) through (e) are executed at ambient temperature.

25 31. The method of claim 29, further comprising the step of adding to said emulsion at least one substance selected from the group consisting of flavor, preservative, colorant, acid, and salt.

32. The method of claim 29, further comprising the step of adding to said

30 emulsion at least one dietary supplement.

33. The method of claim 29, wherein said at least one vegetable oil maintains its chemical make-up throughout steps (a) to (e).

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34. The method of claim 29, wherein said at least one vegetable oil is selected from the group consisting of olive oil, cocoa oil, sunflower seed oil, soybean oil, corn oil, sesame oil, peanut oil, coconut oil and palm oil.

5 35. The method of claim 29, wherein said at least one vegetable oil is olive oil.

36. The method of claim 29, wherein said at least one vegetable oil is a liquid oil at ambient temperature.

10 37. The method of claim 26, wherein at least one hydrocolloid is a fiber.

38. The method of claim 37, wherein said fiber is a nutritional fiber or cellulose.

39. The method of claim 38, wherein said nutritional fiber is inulin.

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40. The method of claim 39, wherein said inulin is selected from the group consisting of instant gelating inulin and long chain inulin.

41. The method of claim 38, wherein said cellulose is selected from the group
20 consisting of alpha cellulose, CMC, HPC, HPMC, MC and microcrystalline cellulose

42. The method of claim 32, wherein said flavor is independently selected from the group consisting of butter flavor, butter vanilla flavor, olive flavor, cocoa or chocolate flavor, roasted mushroom flavor, broccoli flavor, celery flavor, grilled eggplant flavor,
25 asparagus flavor, green bell pepper flavor, raw carrot flavor, fried onion flavor, roasted garlic flavor or artichoke flavor, said preservative is independently selected from the group consisting of potassium sorbate, sodium benzoate, lactic acid, propionic acid and citric acid, said colorant is independently selected from the group consisting of carotenoids, riboflavin, curcumin, beet powder, red color MN and spinach oleoresin, said acid is
30 independently selected from the group consisting of citric acid and glucono delta lactone, whereas said salt is independently selected from the group consisting of sodium chloride and potassium chloride.

43. The method of claim 29, wherein said emulsifier is selected from the group
35 consisting of lecithin and sucrose stearate.

44. The method of claim 29, wherein said stabilizer is selected from the group consisting of natural seaweed extract, natural seed gum, natural plant exudate, natural fruit extract, animal skin and bone extract, bio-synthetic gum, and starch.

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45. The method of claim 44, wherein:

- (a) said natural seaweed extract is independently selected from the group consisting of carrageenan, alginates, agar, agarose, fucellan and xanthan gum;
- 10 (b) said natural seed gum is independently selected from the group consisting of guar gum, locust bean gum, tara gumi, tamarind gum and psillium gum;
- (c) said natural plant exudate is independently selected from the group consisting of gum arabic, tragacanth, karaya and ghaui;
- (d) said natural fruit extract is independently selected from the group consisting of low and high methoxyl pectins;
- 15 (e) said animal skin and bone extract is independently selected from the group consisting of gelatin A and B and hydrolyzed gelatin;
- (f) said bio-synthetic gum is independently selected from the group consisting of xanthan, gellan, curdian and pullulan; and
- 20 (g) said starch is independently selected from the group consisting of natural starch and chemically, physically and enzymatically modified starch.

46. The method of claim 32, wherein said dietary supplement is red yeast.

25 47. The butterlike composition of claim 46, wherein red yeast is at an amount of about 0.1-2.4 weight percent.

48. The method of claim 32, wherein said butterlike composition comprises about 5-30 weight percent fat.

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49. The method of claim 48 wherein said butterlike composition comprises less than 5 weight percent saturated fat.

50. The method of claim 48 wherein said butterlike composition comprises 35 ingredients providing 50-250 Calories per 100 grams.

51. The method of claim 49 wherein said butterlike composition comprises ingredients providing 50-250 Calories per 100 grams.

5 52. The method of claim 29, wherein said butterlike composition comprises less than 5 weight percent saturated fat.

53. The method of claim 52 wherein said butter-like composition comprises ingredients providing 50-250 Calories per 100 grams.
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54. The method of claim 29, wherein said butterlike composition comprises ingredients providing 50-250 Calories per 100 grams and having butterlike properties.

55. The method of claim 29, wherein said butterlike composition comprises
15 about 15-25 weight percent oil and 20-40 weight percent fiber.

56. The method of claim 55, wherein the fiber is at an amount of about 20-30 weight percent.

20 57. A method of preparing a butterlike composition comprising the steps of:
(a) mixing at least one fiber with water;
(b) while mixing, slowly raising the temperature until the fiber is dissolved or dispersed;
(c) while mixing, slowly adding at least one vegetable oil together with at least
25 one emulsifier to the mixture and optionally a stabilizer to obtain a stabilized emulsion;
(d) allowing the stabilized emulsion to cool while mixing;
(e) pouring the cooled emulsion of step (d) into molds and allowing the cooled emulsion of step (e) to solidify, thereby obtaining the butterlike composition.

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58. The method of claim 57, wherein step (a) is executed at 25°C.

59. The method of claim 57, wherein the temperature in step (b) is raised to 90-100°C.

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60. The method of claim 57, wherein the emulsion of step (d) is cooled to 60-70°C.

61. The method of claim 57, further comprising the step of adding to the emulsion of step (d) at least one substance selected from the group consisting of flavor, preservative, colorant, acid and salt.

62. The method of claim 57, further comprising the step of adding to the emulsion of step (d) at least one dietary supplement.

63. The method of claim 57, wherein said at least one vegetable oil maintains its chemical make-up throughout steps (a) to (e).

64. The method of claim 57, wherein said at least one vegetable oil is selected from the group consisting of olive oil, cocoa oil, sunflower seed oil, soybean oil, corn oil, sesame oil, peanut oil, coconut oil and palm oil.

65. The method of claim 57, wherein said at least one vegetable oil is olive oil.

66. The method of claim 57, wherein said at least one vegetable oil is a liquid oil at ambient temperature.

67. The method of claim 57, wherein said at least one fiber is a nutritional fiber or cellulose.

68. The method of claim 67, wherein said nutritional fiber is inulin.

69. The method of claim 68, wherein said inulin is selected from the group consisting of instant gelating inulin and long chain inulin.

70. The method of claim 67, wherein said cellulose is selected from the group consisting of alpha cellulose, CMC, HPC, HPMC, MC and microcrystalline cellulose

71. The method of claim 61, wherein said flavor is independently selected from the group consisting of butter flavor, butter vanilla flavor, olive flavor, cocoa, chocolate

flavor, roasted mushroom flavor, broccoli flavor, celery flavor, grilled eggplant flavor, asparagus flavor, green bell pepper flavor, raw carrot flavor, fried onion flavor, roasted garlic flavor or artichoke flavor, said preservative is independently selected from the group consisting of potassium sorbate, sodium benzoate, lactic acid, propionic acid and citric acid, said colorant is independently selected from the group consisting of carotenoids, riboflavin, curcumin, beet powder, red color MN and spinach oleoresin, said acid is independently selected from the group consisting of citric acid and glucono delta lactone, whereas said salt is independently selected from the group consisting of sodium chloride and potassium chloride.

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72. The method of claim 57, wherein said emulsifier is selected from the group consisting of lecithin and sucrose stearate..

73. The method of claim 57, wherein said stabilizer is selected from the group consisting of natural seaweed extract, natural seed gum, natural plant exudate, natural fruit extract, animal skin and bone extract, bio-synthetic gum, and starch.

74. The method of claim 73, wherein:

(a) said natural seaweed extract is independently selected from the group consisting of carrageenan, alginates, agar, agarose, fucellan and xanthan gum;

(b) said natural seed gum is independently selected from the group consisting of guar gum, locust bean gum, tara gumi, tamarind gum and psillium gum;

(c) said natural plant exudate is independently selected from the group consisting of gum arabic, tragacanth, karaya and ghaui;

(d) said natural fruit extract is independently selected from the group consisting of low and high methoxyl pectins;

(e) said animal skin and bone extract is independently selected from the group consisting of gelatin A and B and hydrolyzed gelatin;

(f) said bio-synthetic gum is independently selected from the group consisting of xanthan, gellan, curdian and pullulan; and

(g) said starch is independently selected from the group consisting of natural starch and chemically, physically and enzymatically modified starch.

75. The method of claim 62, wherein said dietary supplement is red yeast.

76. The butterlike composition of claim 75, wherein red yeast is at an amount of about 0.1-2.4 weight percent.

77. The method of claim 57, wherein said butterlike composition comprises
5 about 5-30 weight percent fat.

78. The method of claim 77 wherein said butterlike composition comprises less than 5 weight percent saturated fat.

10 79. The method of claim 77 wherein said butterlike composition comprises ingredients providing 50-250 Calories per 100 grams.

80. The method of claim 79 wherein said butterlike composition comprises ingredients providing 50-250 Calories per 100 grams.
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81. The method of claim 57, wherein said butterlike composition comprises less than 5 weight percent saturated fat.

82. The method of claim 81 wherein said butter-like composition comprises
20 ingredients providing 50-250 Calories per 100 grams.

83. The method of claim 57, wherein said butterlike composition comprises ingredients providing 50-250 Calories per 100 grams and having butterlike properties.

25 84. The method of claim 57, wherein said butterlike composition comprises about 15-25 weight percent oil and 20-40 weight percent fiber.

85. The method of claim 84, wherein the fiber is at an amount of about 20-30 weight percent.
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INTERNATIONAL SEARCH REPORT

International Application No

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A23D7/00 A23D7/015

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A23D A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 106 644 A (EL-NOKALY MAGDA) 21 April 1992 (1992-04-21)	1-5, 7, 8, 11, 12, 17, 20, 22, 26-34, 36-38, 41, 43, 48, 50, 55-57
A	abstract column 9, line 15 - line 65; table 1 column 18, line 36 - column 19, line 59 examples 1, 5, 6 claims --- -/--	16, 18, 42, 44

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/IL 99/00313

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 596 546 A (UNILEVER PLC ; UNILEVER NV (NL)) 11 May 1994 (1994-05-11)	1-5, 7-10, 13, 18, 20-31, 33, 34, 36, 37, 39, 40, 52-56 16
A	abstract page 2, line 45 - page 4, line 52 claims; example 3 ---	
X	US 5 624 702 A (SCHOTEL RONALD A) 29 April 1997 (1997-04-29)	1-5, 7-10, 13, 18, 20-28
	column 2, line 25 - line 30 column 3, line 5 - line 9 column 4, line 5 - line 7 claims ---	
X	EP 0 605 217 A (GEN FOODS INC) 6 July 1994 (1994-07-06)	1, 2, 4, 8-10, 20-28
	abstract page 3, line 10 - line 33 claims ---	
X	WO 96 03888 A (UNILEVER NV ; UNILEVER PLC (GB)) 15 February 1996 (1996-02-15)	57, 61, 64, 67-69, 77-85
	examples 5, 15, 16 ---	
X	US 4 156 021 A (RICHARDSON TERENCE W) 22 May 1979 (1979-05-22)	29-34, 36-38, 41, 44, 42, 43, 45-56
A	claims; example 3 ---	
P, X	US 5 846 592 A (ALDERLIESTEN LEENDERT ET AL) 8 December 1998 (1998-12-08) the whole document ---	1
X	US 4 814 195 A (YOKOYAMA WALLACE H ET AL) 21 March 1989 (1989-03-21) abstract; examples ---	1
A	EP 0 648 425 A (GEN FOODS INC) 19 April 1995 (1995-04-19) ---	
A	WO 94 22319 A (UNITED DOMINION IND INC) 13 October 1994 (1994-10-13) ---	
	--- -/--	

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IL 99/00313

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GB 2 296 254 A (CHARLEVILLE RES) 26 June 1996 (1996-06-26) abstract; claims</p> <p>-----</p>	6,65

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IL 99/00313

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5106644	A	21-04-1992	CA 2081017 A,C DE 69117753 D DE 69117753 T EP 0531346 A JP 5508314 T WO 9118522 A	26-11-1991 11-04-1996 02-10-1996 17-03-1993 25-11-1993 12-12-1991
EP 0596546	A	11-05-1994	AT 172079 T AT 175074 T AU 684476 B AU 5333894 A AU 681866 B AU 5372394 A CA 2148374 A,C CA 2148378 A,C CZ 9501122 A DE 69321553 D DE 69321553 T DE 69322876 D DE 69322876 T WO 9409647 A WO 9409648 A EP 0666716 A EP 0864254 A EP 0872186 A HU 72553 A PL 308756 A SK 55695 A US 5846592 A ZA 9307870 A ZA 9308104 A	15-10-1998 15-01-1999 18-12-1997 24-05-1994 11-09-1997 24-05-1994 11-05-1994 11-05-1994 13-12-1995 19-11-1998 29-04-1999 11-02-1999 29-07-1999 11-05-1994 11-05-1994 16-08-1995 16-09-1998 21-10-1998 28-05-1996 21-08-1995 13-09-1995 08-12-1998 24-04-1995 02-05-1995
US 5624702	A	29-04-1997	EP 0605020 A AT 110526 T AT 175074 T AU 681866 B AU 5372394 A AU 6206294 A AU 8001798 A CA 2148374 A,C CA 2158263 A CZ 9501122 A DE 69300006 D DE 69300006 T DE 69322876 D DE 69322876 T DK 605020 T WO 9409648 A WO 9421131 A EP 0666716 A EP 0690676 A EP 0864254 A EP 0872186 A HU 72553 A PL 308756 A US 5846592 A ZA 9401489 A	06-07-1994 15-09-1994 15-01-1999 11-09-1997 24-05-1994 11-10-1994 08-10-1998 11-05-1994 29-09-1994 13-12-1995 06-10-1994 26-01-1995 11-02-1999 29-07-1999 30-01-1995 11-05-1994 29-09-1994 16-08-1995 10-01-1996 16-09-1998 21-10-1998 28-05-1996 21-08-1995 08-12-1998 04-09-1995

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IL 99/00313

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0605217 A	06-07-1994	CA 2110195 A EP 0876764 A FI 935870 A NO 934824 A US 5501869 A	29-06-1994 11-11-1998 29-06-1994 29-06-1994 26-03-1996
WO 9603888 A	15-02-1996	AU 695202 B AU 3222695 A CA 2196582 A DE 69505395 D DE 69505395 T EP 0773722 A	06-08-1998 04-03-1996 15-02-1996 19-11-1998 29-04-1999 21-05-1997
US 4156021 A	22-05-1979	AU 2244277 A CA 1085218 A DE 2709297 A FR 2342667 A GB 1575816 A JP 52108036 A NZ 183356 A	24-08-1978 09-09-1980 08-09-1977 30-09-1977 01-10-1980 10-09-1977 05-03-1980
US 5846592 A	08-12-1998	EP 0605019 A EP 0605020 A AT 172079 T AT 175074 T AU 684476 B AU 5333894 A AU 681866 B AU 5372394 A CA 2148374 A,C CA 2148378 A,C CZ 9501122 A DE 69321553 D DE 69321553 T DE 69322876 D DE 69322876 T WO 9409647 A WO 9409648 A EP 0596546 A EP 0666716 A EP 0864254 A EP 0872186 A HU 72553 A PL 308756 A SK 55695 A ZA 9307870 A ZA 9308104 A AT 142436 T AU 694101 B AU 5859894 A CA 2153800 A,C DE 69400525 D DK 679063 T WO 9415487 A EP 0679063 A US 5468512 A ZA 9400130 A AT 110525 T	06-07-1994 06-07-1994 15-10-1998 15-01-1999 18-12-1997 24-05-1994 11-09-1997 24-05-1994 11-05-1994 11-05-1994 13-12-1995 19-11-1998 29-04-1999 11-02-1999 29-07-1999 11-05-1994 11-05-1994 11-05-1994 16-08-1995 16-09-1998 21-10-1998 28-05-1996 21-08-1995 13-09-1995 24-04-1995 02-05-1995 15-09-1996 16-07-1998 15-08-1994 21-07-1994 17-10-1996 24-02-1997 21-07-1994 02-11-1995 21-11-1995 10-07-1995 15-09-1994

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IL 99/00313

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5846592 A		AU 6206194 A	11-10-1994
		AU 8001698 A	08-10-1998
		CA 2158261 A	29-09-1994
		DE 69300005 D	06-10-1994
		DE 69300005 T	26-01-1995
		DK 605019 T	27-03-1995
		WO 9421132 A	29-09-1994
		EP 0690677 A	10-01-1996
		ZA 9401488 A	04-09-1995
		AT 110526 T	15-09-1994
		AU 6206294 A	11-10-1994
		AU 8001798 A	08-10-1998
		CA 2158263 A	29-09-1994
US 4814195 A	21-03-1989	NONE	
EP 0648425 A	19-04-1995	US 5501869 A	26-03-1996
		CA 2132502 A	19-04-1996
		CA 2150086 A	09-12-1995
WO 9422319 A	13-10-1994	US 5352475 A	04-10-1994
		AU 6497994 A	24-10-1994
		BR 9405853 A	05-12-1995
		CA 2158753 A	13-10-1994
		EP 0692933 A	24-01-1996
		JP 8508408 T	10-09-1996
GB 2296254 A	26-06-1996	IE 940987 A	26-06-1996